Picture of the Week: Tickling the dragon for explosives science

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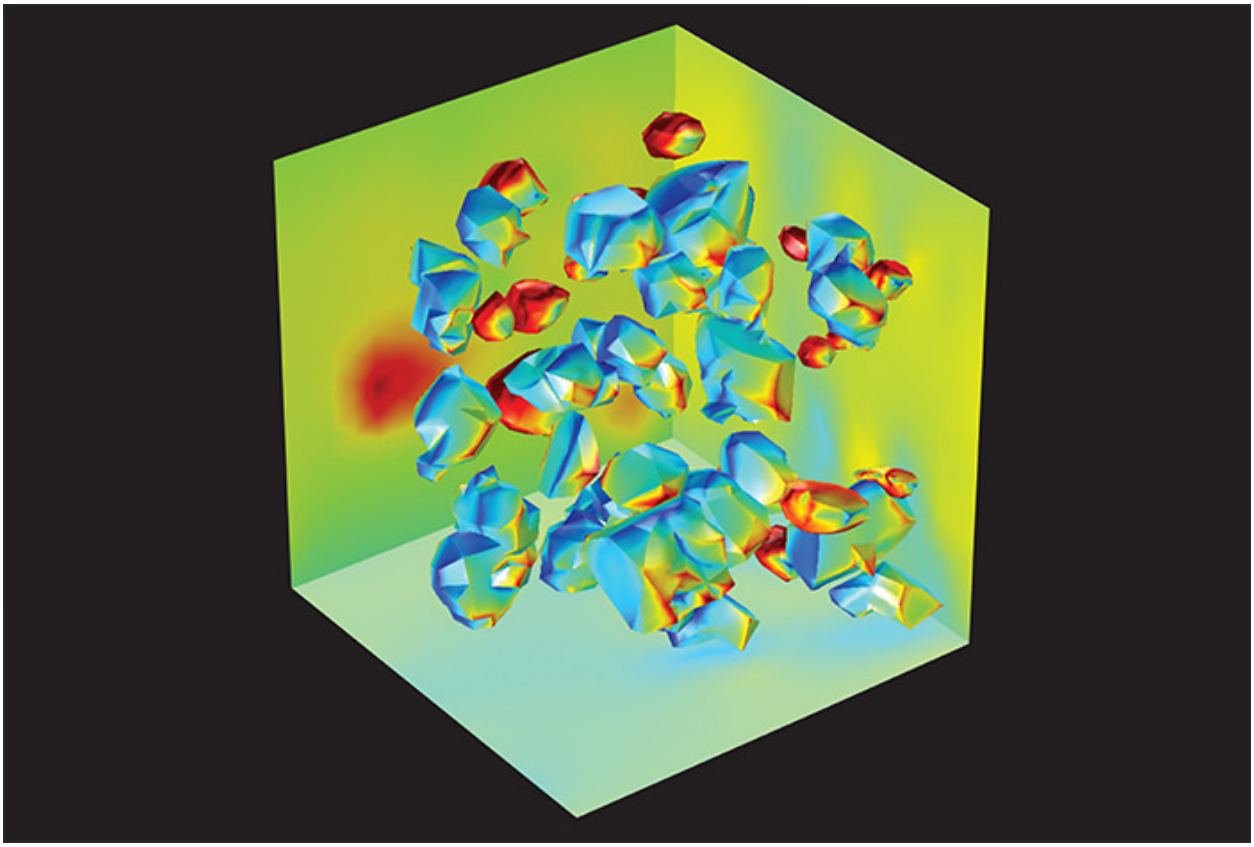

Tickling the dragon for explosives science

For obvious reasons, detecting explosives without blowing them up is a prime goal in law enforcement, anti-terror operations, and combat. But avoiding detonation requires a deep understanding of the complex interplay of chemistry and heat transport in explosive materials. Scientists from the Theoretical, Explosive Science and Shock Physics, and Materials Science and Technology divisions at Los Alamos National Laboratory have performed the first 3D simulation of electromagnetic radiation interacting with explosives. The simulation used realistic structural data gleaned from x-ray computed tomography scans of energetic materials. The information might someday help bomb-squad units detect the presence of explosives from a safe distance.

This image shows the electromagnetic field distribution inside a common explosive using HMX-Viton binder. In the figure you can see light concentrated in small hot spots

around the sharp corners of HMX crystals. These hot spots strongly absorb radiation, which quickly heats the explosive and causes ignition. Studying the dynamics of these hot spots below the ignition threshold ("tickling the dragon") could provide alternative signatures for stand-off detection of explosives.

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Los Alamos has been studying explosives since the Manhattan Project in World War II. Physicists, chemists, and computational scientists continue to probe the nature of energetic materials and develop new ways of detecting them as part of the Laboratory's national security mission.

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